Claims

[c1] 1.A method for generating transfer functions for use in volume rendering of three-dimensional data of an object volume, the method comprising:
obtaining the three-dimensional data of the object volume;
evaluating selected characteristics for a plurality of samples of the three-dimensional data; and,
computing a transfer function range for volume rendering the three-dimensional data based on the selected characteristics.

[c2] 2.The method of claim 1 wherein the three-dimensional data is subject to noise and low contrast.

[c3] 3.The method of claim 1 wherein the three-dimensional data is acquired by at least one of computed tomography (CT), magnetic resonance (MR), ultrasound, and three-dimensional digital x-ray mammography (3DDM).

[c4] 4.The method of claim 1 wherein the selected characteristics are mean and standard deviation.

[c5] 5.The method of claim 1 wherein the computing of a transfer function range is performed according to:

$$TF(x) = \begin{cases} A & x \le LL \\ \dfrac{B - A}{UL - LL} x + c & LL \prec x \prec UL \\ B & x \ge UL \end{cases}$$

where TF(x) is the transfer function, x is a voxel intensity value, A and B are opacity values and C is the y-intercept with an opacity y-axis, and further where LL is a lower limit of the transfer function range and UL is an upper limit of the transfer function range.

[c6]

6. The method of claim 5 wherein the lower limit and the upper limit are computed according to:

Lower Limit = LL = $\mu - N \times \sigma$, and

Upper Limit = UL = $\mu + N \times \sigma$

where μ, σ, N are the mean, the standard deviation, and the number of standard deviations respectively.

[c7] 7.A method for generating transfer functions for use in volume rendering of a three-dimensional data set of an object volume, the method comprising:
obtaining the three-dimensional data set of the object volume;
sampling the three-dimensional data set to generate a plurality of samples of the object volume;
measuring the mean and standard deviation for the plurality of samples;
generating a transfer function range based on the measuring of the mean and standard deviation for the samples, the transfer function being used for volume rendering the three-dimensional data.

[c8] 8.The method of claim 7 wherein the transfer function range comprises an upper limit and a lower limit.

[c9] 9.The method of claim 8 wherein the upper limit is UL and the lower limit is LL, and wherein UL and LL are computed according to:

Lower Limit = LL = $\mu - N \times \sigma$, and

Upper Limit = UL = $\mu + N \times \sigma$

where μ, σ, N are the mean, the standard deviation, and the number of standard deviations respectively.

[c10] 10.The method of claim 7 wherein the three-dimensional data set is subject to noise and low contrast.

[c11] 11.The method of claim 7 wherein the three-dimensional data set is acquired by at least one of computed tomography (CT), magnetic resonance (MR) and three-dimensional digital x-ray mammography (3DDM).

[c12]

12.A system for volume rendering of three-dimensional data of an object

volume comprising:

an imaging device for obtaining image data of the object volume;

an image processing device coupled to the imaging device for generating at least one three-dimensional image data set of the object volume based on obtained image data, the image processing device being adapted to compute a transfer function range for use in volume rendering.

[c13] 13.The system of claim 12 wherein the imaging device comprises at least one of a computed tomography (CT) device, a magnetic resonance (MR) imaging device, ultrasound and a three-dimensional digital x-ray mammography (3DDM) device.

[c14] 14.The system of claim 12 wherein the image processing device is further adapted to compute the transfer function range substantially simultaneously with obtaining the image data of the object volume.

[c15] 15.The system of claim 12 wherein the three-dimensional data is subject to noise and low contrast.